

# Status and Trends of NJ Coastal Wetlands Monitoring and Sea Level Rise

*(NJ MACWA Highlights)*

***NJ Water Monitoring Council Meeting  
May 19, 2016***

***Martha Maxwell-Doyle***



**Establish an integrated wetlands monitoring and assessment program in the Delaware Bay and Barnegat Bay Estuaries and beyond.**

*To understand the effects of multiple stressors on salt marshes from a regional perspective.*



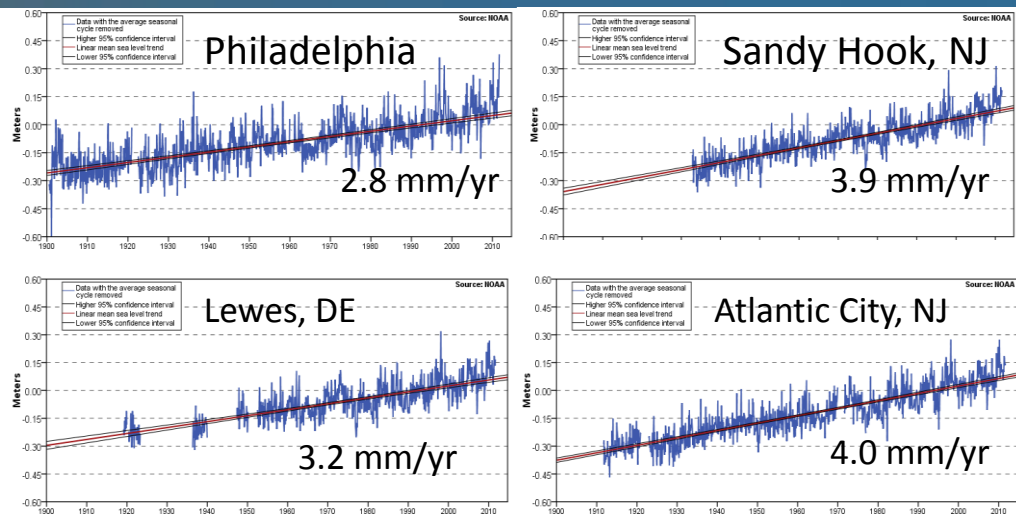
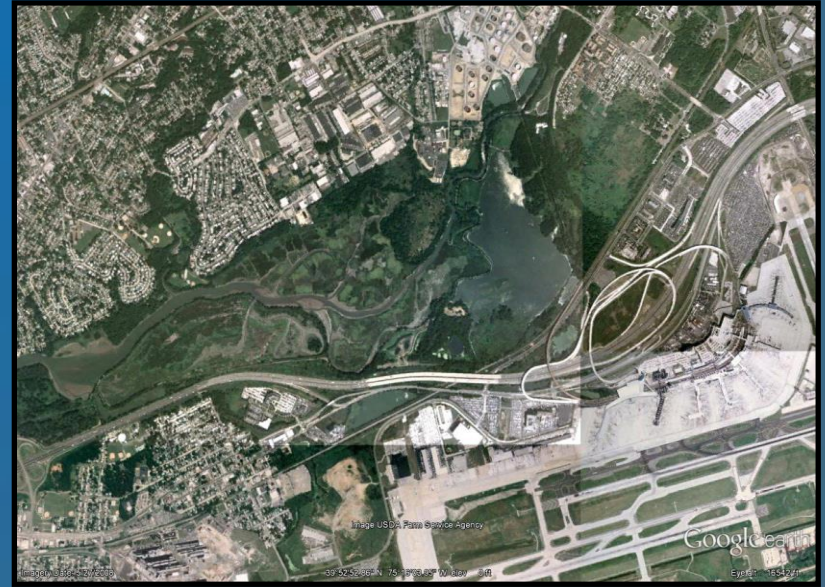
# Causes for Concern

## ALTERED LANDSCAPE

- Coastal development
- Altered sediment load
- Increased nutrient load
- Direct human alterations

## RELATIVE SEA LEVEL RISE

- Salinity, tide range increase



# Coastal Wetlands & Sea-Level Rise

- Tidal marsh survival depends on a **balance** between the forces leading to their **creation** (mineral and organic sediment accumulation) and the forces leading to their **deterioration** (sea-level rise, subsidence and wave erosion).
- The critical factor controlling **wetland sustainability** is the rate of **vertical development** (accretion) compared to the local **relative sea-level rise rate**.

# MACWA Central Questions:

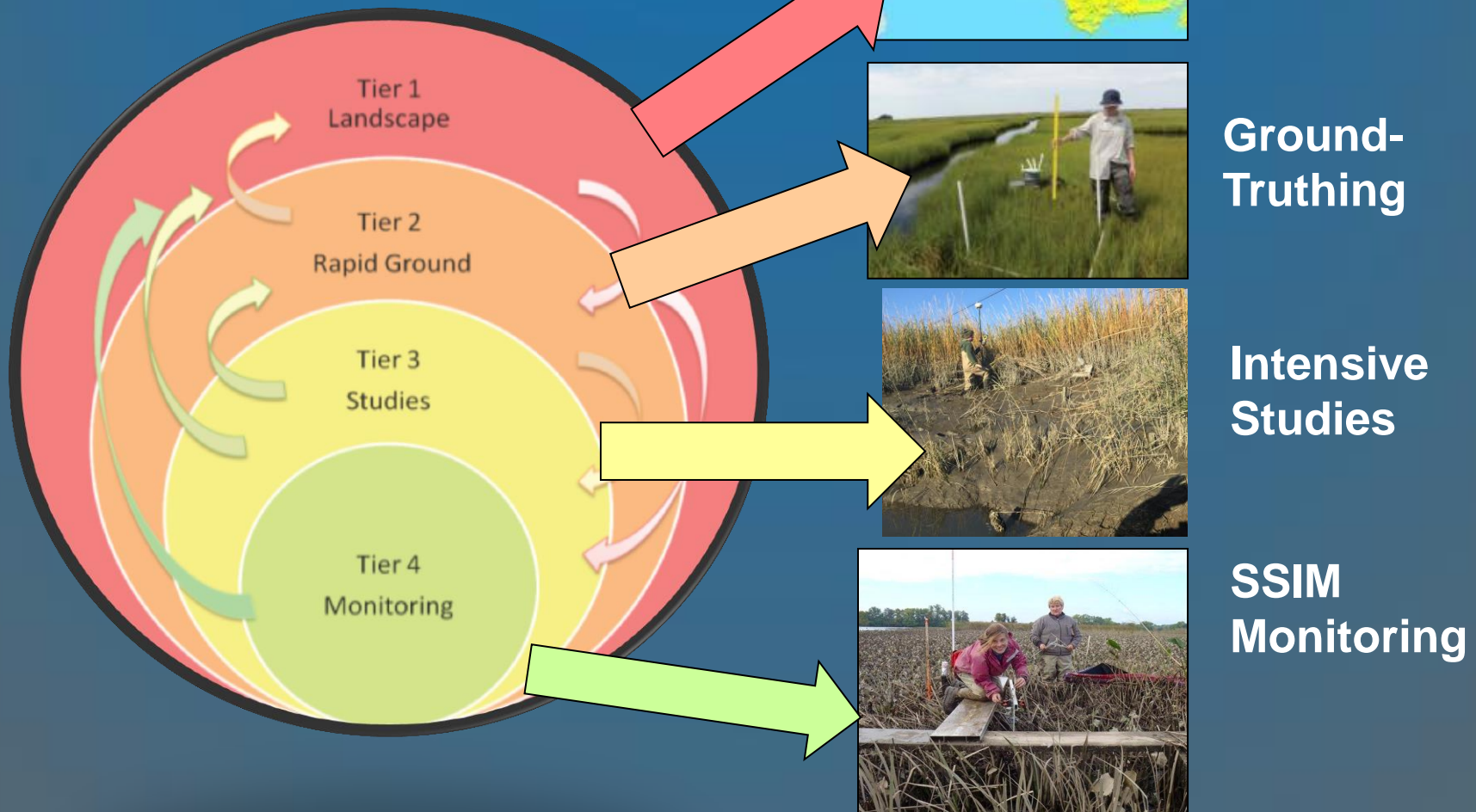
- 1. Are wetlands keeping up with sea level rise?*
- 2. What are the spatial and temporal variation in wetland structure and function over time?*

- Are plant zones and morphology changing over time?
- Are elevations and topography changing over time?
- Is plant productivity above- and belowground changing and how does it contribute to accretion?
- How does water and soil quality relate to accretion and change over time?
- Is there a change in faunal abundance over time?



# EPA<sup>+</sup> Multi-Tiered Wetlands Monitoring Framework

Integrated monitoring of tidal wetlands for  
water quality, habitat management, and  
climate/restoration planning



# Mid Atlantic Tidal Rapid Assessments (MidTRAM)

MidTRAM protocol uses high resolution variables that help to predict stress responses and relationships.

The suite of variables collected represent four categories important for the maintenance of a wetland.

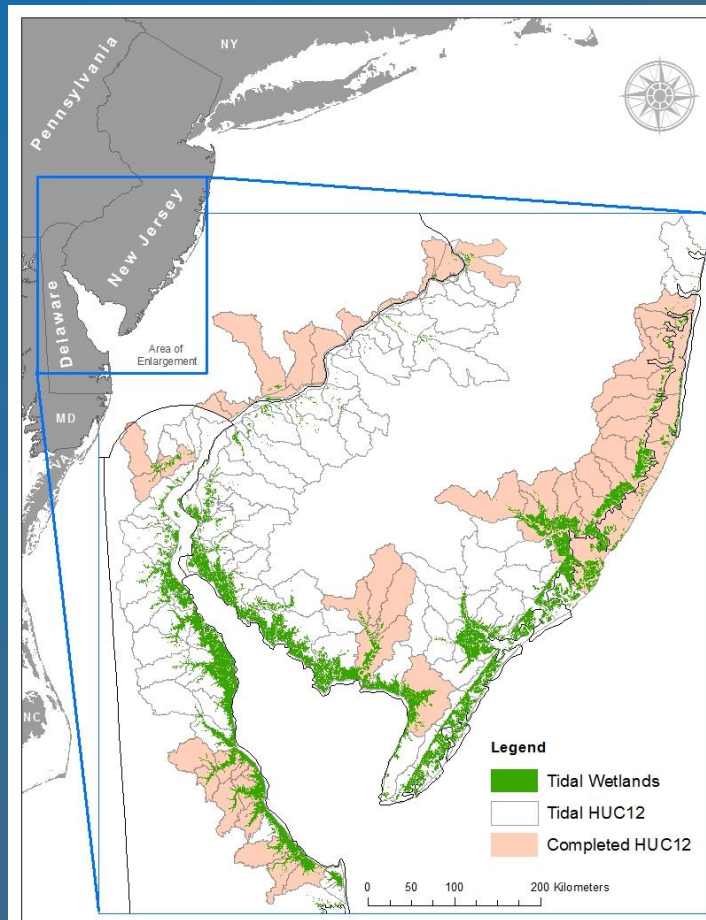
Attribute Group	Scored Metrics
Buffer and Landscape	% of Assessment area perimeter with 5m-Buffer Average Buffer Width Surrounding development Landscape Condition within 250m Barriers to Landward Migration
Hydrology	Ditching & Draining Fill & Fragmentation Diking & Restriction Point Source
Habitat	Bearing Capacity Vegetative Obstruction Number of Plant Layers % of Non-native co-dominant plant species % Cover Invasive Plants

# MACWA MidTRAM Sampling to Date

RAM Site	# HUC12s	Tidal Wetland Area within HUCs (ha*)	% of HUC that is Tidal Wetlands	# Points	% Tidal Wetland Area Assessed**
PA tidal	10	517.2	2.0%	30	0.041%
Crosswicks	1	305.3	3.5%	30	0.069%
Christina	3	1222.6	6.2%	30	0.017%
St. Jones	2	3120.5	13.4%	30	0.007%
Murderkill	4	3964.8	14.3%	30	0.005%
Mispiration	3	5130.4	25.9%	34	0.005%
Broadkill	3	6224.3	22.4%	37	0.004%
Maurice	5	4385.6	10.0%	30	0.005%
Dennis	1	3821.6	17.3%	30	0.005%
North BB	7	2512.3	4.2%	30	0.008%
South BB	5	6289.1	14.2%	30	0.003%
Mullica	5	12874.8	24.4%	15	0.001%

Hectare =  $1.0 \times 10^4$  meters<sup>2</sup>

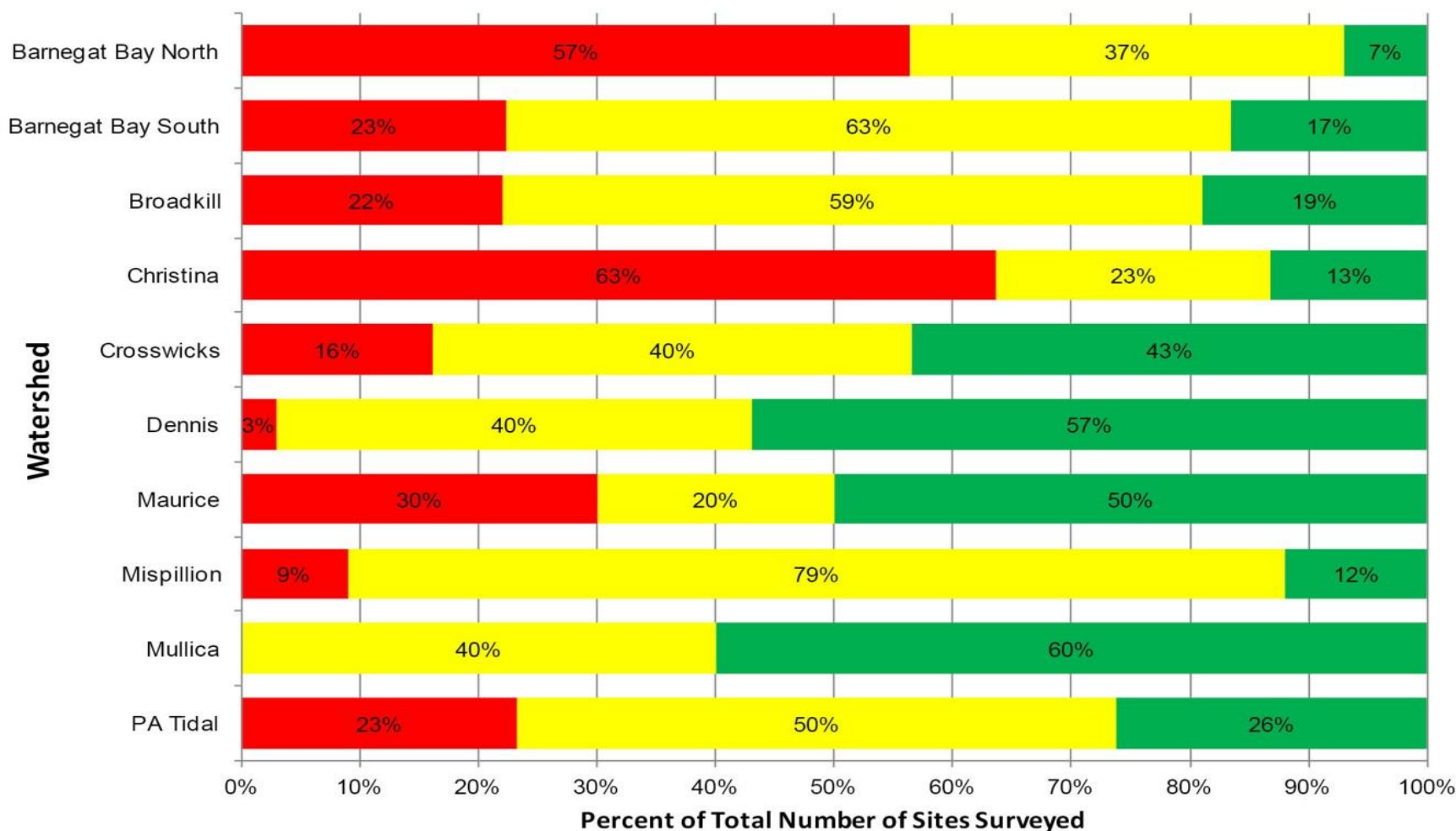
\*\*Area assessed is full 250 buffer (~0.0069 ha) multiplied by the number of RAM points assessed



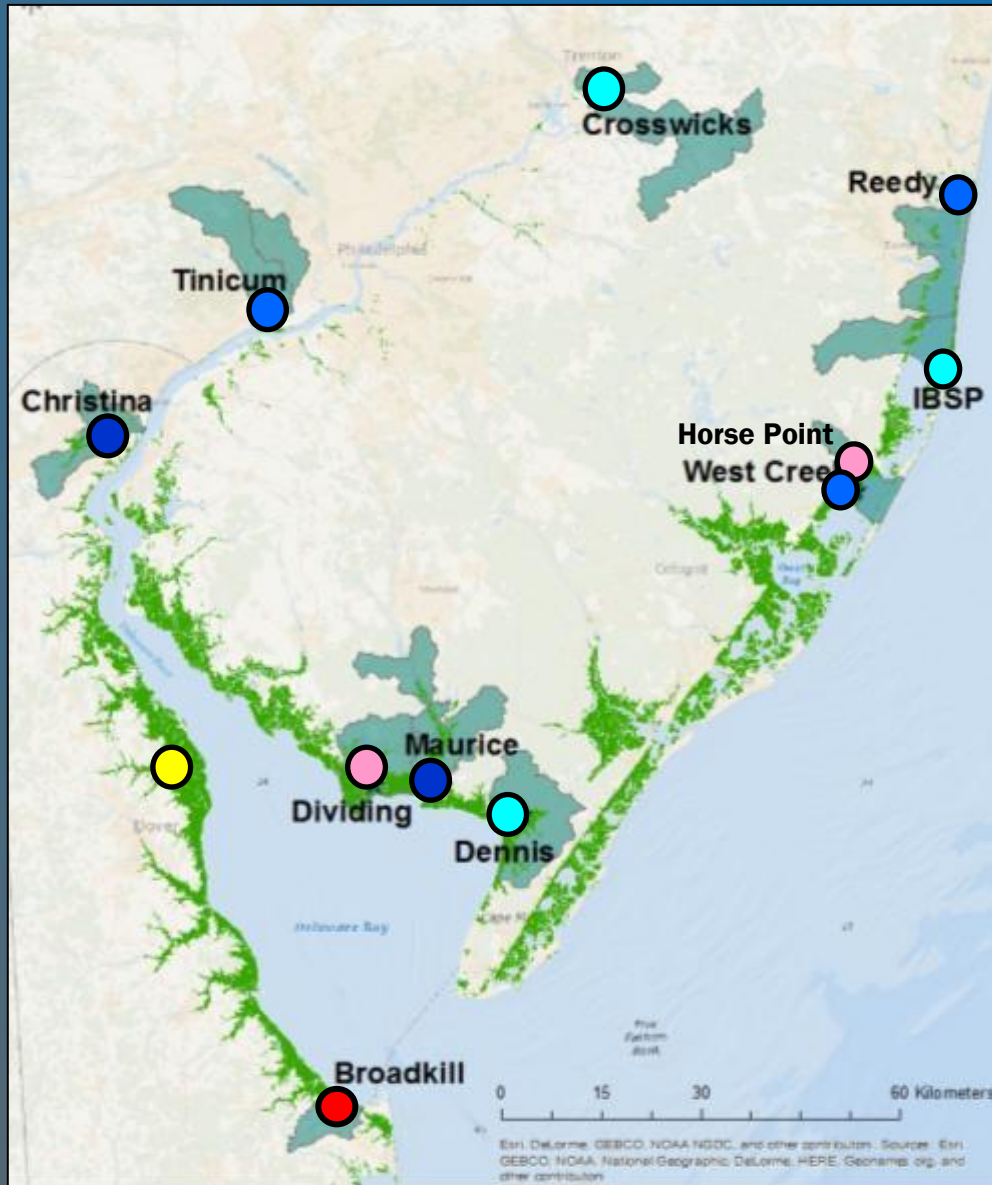
131 HUC12s with tidal habitats in DE, NJ, PA (38, 81, 12, resp.)

➤ 49 HUC12s have been assessed via RAM, or 37.4%

# MidTRAM Overall Comparative Summary



# Site Specific Intensive Monitoring (SSIM)



**12 SSIM Stations  
installed**

**Monitoring progress:**  
3 stations in 2011  
7 stations in 2012  
9 stations in 2013  
12 stations in 2014

- Tidal Wetlands
- SSIM Station 2010
- SSIM Station 2011
- SSIM Station 2012
- SSIM Station 2014
- DNERR Station

# SSIM Metrics

## Elevation and Accretion



## Plant Biomass



## Algal Biomass



## Plant community



## Soil and Water Chemistry

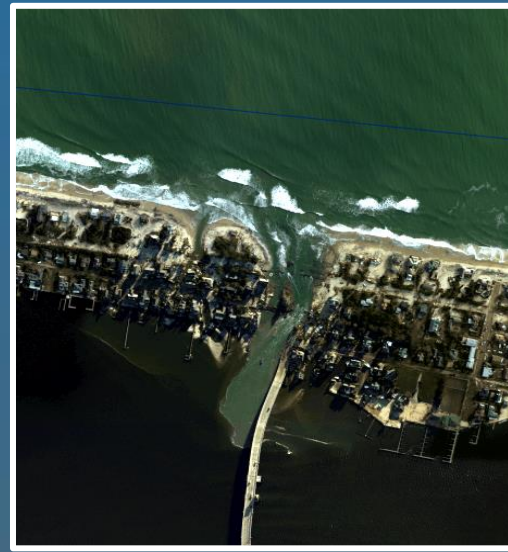
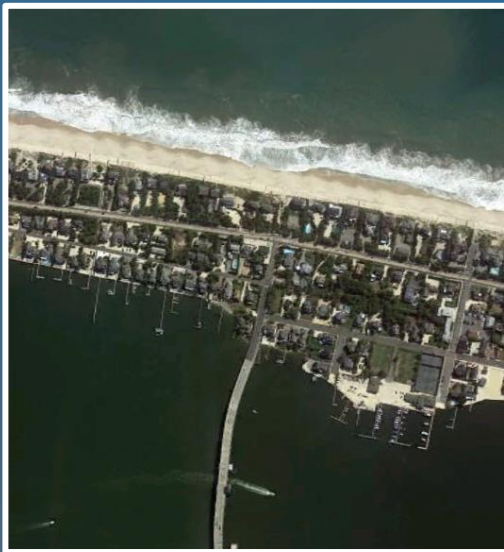


# Initial SSIM Findings (2011-2013):

- Accretion and elevation change are temporally variable, on the order of millimeters per year.
- A majority of SSIM sites are experiencing net erosion
- Barnegat Bay wetlands start at a low elevation making them more vulnerable to SLR  $\approx 3.99 \text{ mm/year}$
- Barnegat marshes have Low to Moderate TSS and are near the threshold level - (Northern Bay wetlands our most vulnerable site)
- IBSP has decreasing elevations and internal conversion to mudflats

# Post Sandy Note:

Despite prolonged and record flooding in Barnegat Bay during Hurricane Sandy in October and the nor'easter one week later, there was no evidence of sediment deposition or subsequent accretion following the storms



# Intensive Studies – Tier 3



- **Ecosystem Service Studies:**  
N removal, levee-building in salt marshes,  
Carbon Sequestration
- **Living Shoreline Tactics:**  
New hybrids to boost coastal wetland  
resilience
- **Marsh Futures (Vulnerability Mapping):**  
Elevation capital and BMP mapping

# Vulnerability Maps – Marsh Futures

Combine data on plant  
growth ranges and elevation

Elevation Capital Mapping

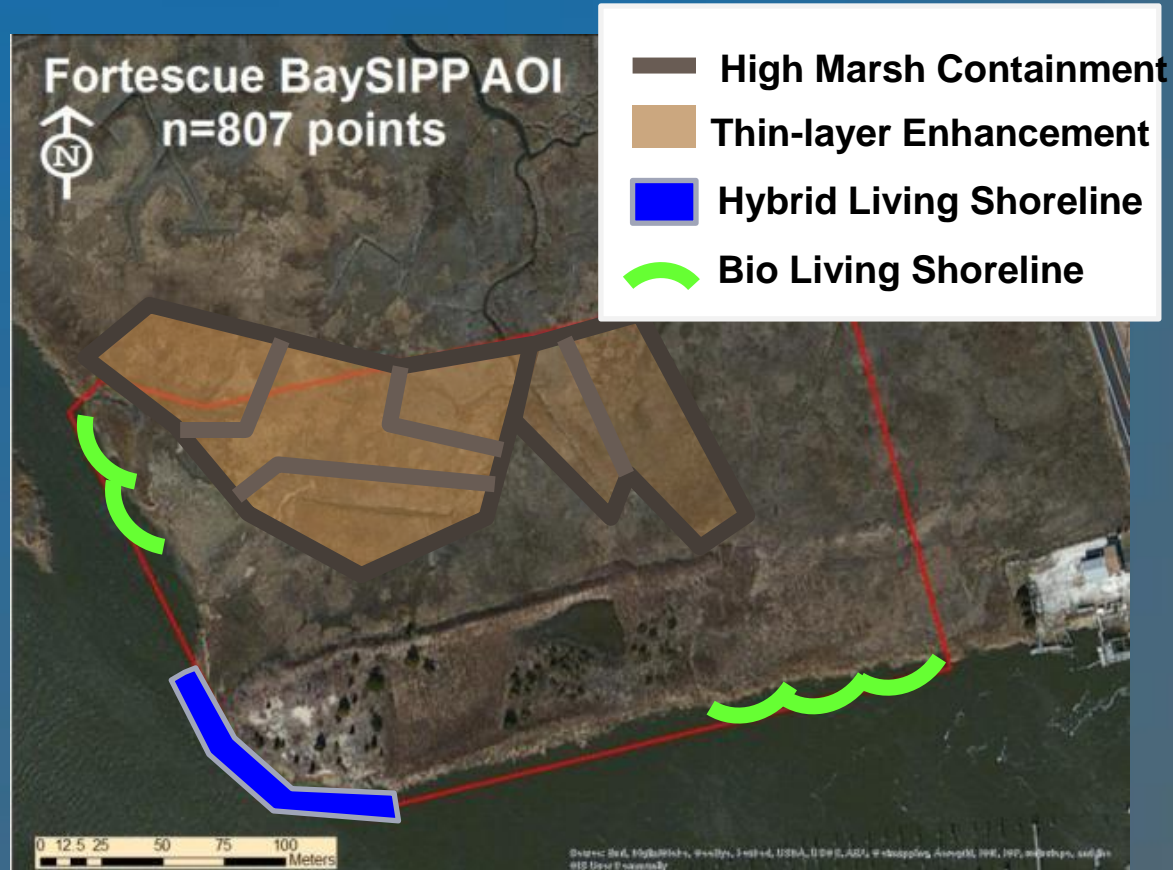
Weighted measures adjusted elevations



# Marsh Futures Maps

Where will various investments yield greatest outcomes?

What should be the sequence of interventions?

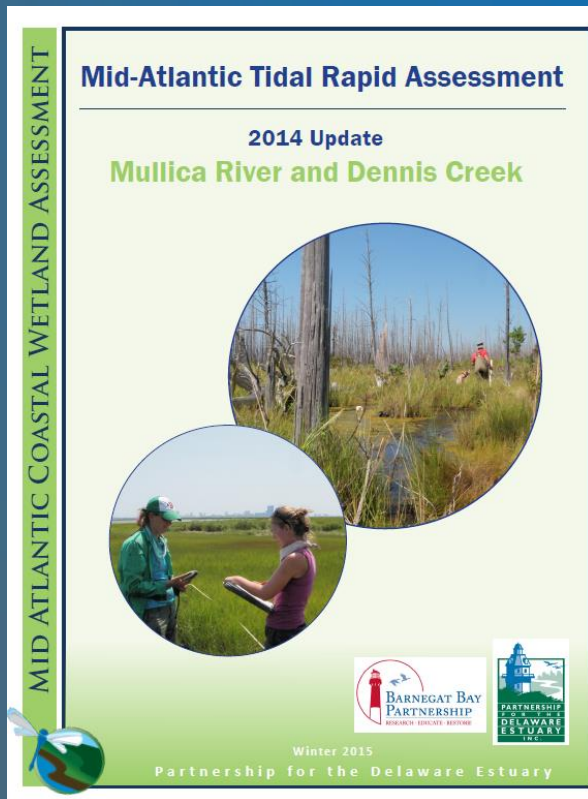


# NEXT STEPS

- **On-going Data Synthesis**
  - Comparative data analyses and management recommendations
  - Continue refinement of SSIM and MidTRAM
- **Translation**
  - Rank stressor priorities by watershed
  - Recommendations for coastal managers
  - Restoration priorities (e.g. marsh futures)
  - Training and assistance
  - Public E/O
  - Link to performance monitoring of resilience projects
- **SSIM – Mid-TRAM Cross Comparison**



# Reports



## Factors Governing the Vulnerability of Coastal Marsh Platforms to Sea Level Rise

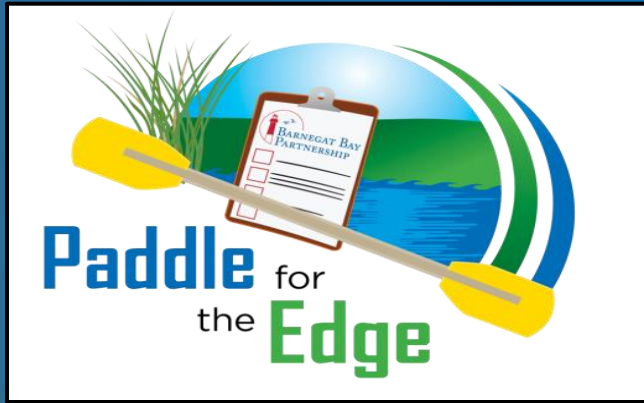


## Monitoring and Assessment of Representative Tidal Wetlands of the Delaware Estuary

A publication of the Partnership for the Delaware Estuary;  
A National Estuary Program

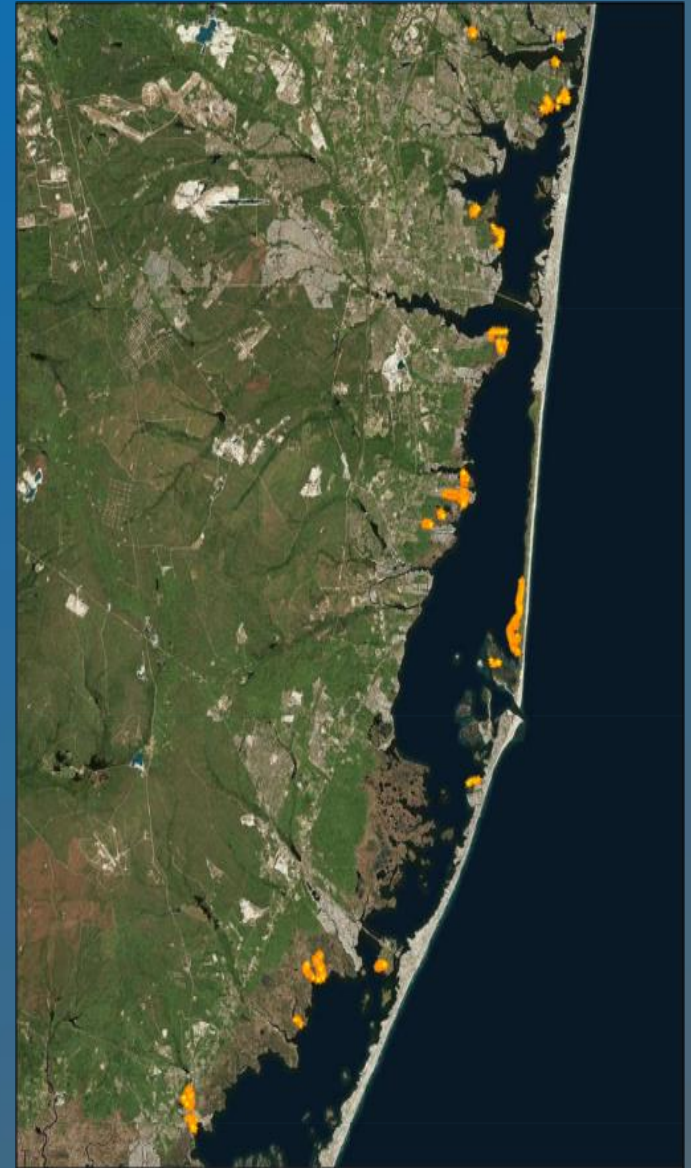
Final Report for The United States Environmental Protection Agency

# Citizen Science and Outreach



**2015 Pilot Year**

**40 Volunteers, 650 Points Taken**  
20 miles (35 km) Paddled and Assessed



# Long Term Needs and Gaps

- Continue & expand long term SSIM
- Impact of OWMM in BB
- Continue to link together other research and assessment activities e.g. WQ Monitoring networks, NRCS Subaquatic Soil Mapping



## New Jersey Wetland Program Plan 2014-2018



First Iteration, December 2013

Prepared by:  
New Jersey Department of Environmental Protection (NJDEP) pursuant to  
The United States Environmental Protection Agency (EPA)  
Enhancing State and Tribal Programs (ESTP) Initiative

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**We Thank the Individuals and Organizations Who Have Assisted  
in the Field, with Workshops, and in Workgroups  
And We Are Grateful to Our Primary Funders since our  
Inception**



*EPA Regions 2 and 3  
EPA Headquarters  
EPA National Estuary Program  
EPA Climate Ready Estuaries  
DE Dept. of Natural Resources  
Environ. Control  
Natural Lands Trust*

*NJ Coastal Management Program  
NJ Dept. of Environ. Protection  
PA Coastal Management Program  
DuPont Clear into the Future  
Geraldine R. Dodge Foundation  
New Jersey Recovery Fund  
The Nature Conservancy  
The Sunoco Foundation*

# Be a Scientist for a Day and...



**Paddle** for  
the **Edge**

## June 18 - July 5, 2016

on the Barnegat Bay!

The Barnegat Bay Partnership is looking for paddling enthusiasts to help collect data about the shorelines of Barnegat Bay. Anyone who has a kayak, canoe, or stand-up paddle board can participate as a citizen scientist. Spend just a few hours on the water (anytime between June 18th and July 5th) recording some basic information at a series of points along your trip and you can help us reach our goal.

### TRAINING DATES:

#### JUNE 8

6:30 – 8:30 p.m.  
Tuckerton Seaport  
(Hunting Shanty)  
120 West Main Street  
Tuckerton, NJ 08087

#### JUNE 9

6:30 – 8:30 p.m.  
Ocean County College  
Southern Education Center  
(Room 117)  
195 Cedar Bridge Road  
Manahawkin, NJ 08050

#### JUNE 13

6:30 – 8:30 p.m.  
Toms River Library  
(Hometown Dairy Room)  
101 Washington Street  
Toms River, NJ 08753



For more information or to register,  
visit [bbp.ocean.edu/pages/380.asp](http://bbp.ocean.edu/pages/380.asp)

Questions? Email [Paddle4theEdge@gmail.com](mailto:Paddle4theEdge@gmail.com)



